MAT 127: Calculus C, Spring 2022
Homework Assignment 8

WebAssign Problems due before 9am, Wednesday, 04/06
20% bonus for submissions **before 9am, Saturday, 04/02**

Written Assignment due before 4pm, Wednesday, 04/06
in your instructor's office (L01 in Math 4-101B, L02/3 in Math 3-111)

Please read Sections 5.4, 5.5.3, and 5.6 thoroughly before starting on the problem set; looking over Sections 8.3 and 8.4 of the WebAssign textbook may be helpful too.

Written Assignment: Problems VIII.1-6 (below and next page)
Show your work; correct answers without explanation will receive no credit, unless noted otherwise.

Please write your solutions legibly; the graders will disregard solutions that are not readily readable. All solutions must be stapled (no paper clips) and have your name (first name first), lecture number (L01, L02, or L03), and HW number in the upper-right corner of the first page.

Problem VIII.1

Find all positive values of b for which the series $\sum_{n=1}^{\infty} b^{\ln n}$ converges.

Problem VIII.2

Suppose $\sum a_n$ and $\sum b_n$ are series with positive terms and $\sum b_n$ is divergent.
(a) If $a_n > b_n$ for all n, what can you say about $\sum a_n$? Why?
(b) If $a_n < b_n$ for all n, what can you say about $\sum a_n$? Why?

Problem VIII.3

If $\sum a_n$ is a convergent series with positive terms, is it true that the series

$$\text{(a)} \quad \sum \ln(1 + a_n) \qquad \text{(b)} \quad \sum \sin(a_n)$$

also converges?

Problem VIII.4

Determine whether the series $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^3 + 1}}$ converges or diverges.

Problem VIII.5

For which of the following series is the Ratio Test inconclusive?

$$\text{(a) } \sum_{n=1}^{\infty} \frac{1}{n^3}, \quad \text{(b) } \sum_{n=1}^{\infty} \frac{n}{2^n}, \quad \text{(c) } \sum_{n=1}^{\infty} \frac{(-3)^{n-1}}{\sqrt{n}}, \quad \text{(d) } \sum_{n=1}^{\infty} \frac{\sqrt{n}}{1+n^2}.$$

Problem VIII.6

Determine whether the following series are absolutely convergent:

$$\text{(a) } \sum_{n=1}^{\infty} (-1)^{n-1} \frac{\sqrt{n}}{n+1} \qquad \text{(b) } \sum_{n=1}^{\infty} (-1)^{n-1} \frac{1 \cdot 3 \cdot \ldots \cdot (2n-1)}{(2n-1)!}.$$